



Lesson Title: Astronauts and the ISS

Subject	Grade Level	Timeline
History of Spaceflight, International Space Station	5-8	30 minutes

Objectives

This lesson investigates the history of the International Space Station (ISS), and the lives of the people who have worked on it. How did the ISS come to be? Who are the astronauts who have been chosen to live and work there in microgravity for months at a time?

In the accompanying video, astronaut Paolo Nespoli talks about some of the difficulties of living aboard the ISS. He also discusses some similarities and differences between the United States' space shuttles and the Russian Soyuz space vehicles, and what keeps astronauts busy during their time on the station.

Standards

Common Core State Standards Connections:

ELA/Literacy –

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS2-6)

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HSPS1-3)

WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3)

WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3)

Materials

Internet access





Vocabulary

- Astronaut - the title for those selected to join the National Aeronautics and Space Administration (NASA) corps of astronauts who make "space sailing" their career profession.

Lesson Plan

Begin by asking students what they know about the International Space Station (ISS). Record their answers on the board.

Review the following information with students:

- ISS is a space station in orbit around the Earth. It is the largest artificial satellite ever built.
- ISS was put together in space. Modules were built on Earth and launched into orbit for construction beginning in 1998.
- ISS has been continuously inhabited since November 2, 2000. Crewmembers come from many different countries.

Engage students in a WebQuest on some aspects of the history of the International Space Station and the astronauts who are on board now, or who have been on board in the past. Have students work in pairs to research their assigned topic and prepare group presentations. Suggested topics are broken up into two categories below, 1) astronaut biographies and 2) components of the ISS.

1) Astronaut Biography topics

Each student pair can be assigned an astronaut. Examples given below are of significance to the ISS or to the broader history of spaceflight.

- The website howmanypeopleareinspace.com maintains an up-to-date list of how many people are in space at the moment, listing their names, nations of origin, and how long they have been in space. (The site links each person's name to a brief biography on Wikipedia.)
- Some of the astronauts associated with the ISS include:
 - Bill Shepherd
 - Yuri Gidzenko
 - Sergei Krikalev
 - Peggy Whitson





- Thomas Reiter
- Chris Hadfield
- Paolo Nespoli
- Koichi Wakata
- Randy Bresnik

(for a complete list, visit https://www.nasa.gov/mission_pages/station/expeditions/past.html)

- Astronauts significant to the broader history of near-Earth spaceflight:

- Yuri Gagarin
- Alan B. Shepard
- John Herrington
- Vladimir Remek
- Valentina Tereshkova
- Marc Garneau
- Yang Liwei
- Mae Jemison
- Guy Bluford
- Sally Ride
- Liu Yang
- Marcos Pontes

Also consider looking up astronauts from your geographic area.

2) ISS topics

The ISS is even more complicated than other spaceflight endeavors, in part because it is an international program. The design, funding, construction, and management of both the hardware and personnel are a complex cooperative effort. The Station was actually built in orbit, with different parts of the station being launched and connected over many years starting in 1998.

Each student pair can be assigned a part of the ISS to research and report on.

- The 'Zarya' Control Module
- The 'Unity' Node
- The Zvezda Service Module
- The Integrated Truss Structure
- The 'Destiny' Laboratory Module
- Multipurpose Laboratory Module Nauka
- Node-2 'Harmony' module
- Columbus laboratory
- Kibo laboratory
- Poisk Module
- Node-3 'Tranquility' module
- Permanent Multipurpose Module Leonardo
- Bigelow Expandable Activity Module

More topics related to the ISS:

- Space Shuttle
- Soyuz Spacecraft
- SpaceX Dragon Spacecraft





3) Geographic topics

Have students locate the nations that are working together to build the ISS on a world map. ISS is a project of collaboration between the space agencies of the United States, Russia, Europe, Japan, and Canada. The European Space Agency (ESA) members are Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, and United Kingdom.

Extensions

Explore the ISS version of “Street View” on Google Maps here:

<https://www.google.com/maps/@29.5603465,-95.0853519,3a,75y,288.5h,78.55t/data=!3m6!1e1!3m4!1sH344uAn0-24AAAQvxgbyDw!2e0!7i10000!8i5000>





Resources

- **A history of the European Space Agency**
http://www.esa.int/About_Us/Welcome_to_ESA/ESA_history/A_history_of_the_European_Space_Agency
- **How many people are in space right now?** <http://www.howmanypeopleareinspace.com/>
- **NASA website on ISS international cooperation**
https://www.nasa.gov/mission_pages/station/cooperation/index.html
- **ESA website on Building the International Space Station** (includes parts and timeline)
http://m.esa.int/Our_Activities/Human_Spaceflight/International_Space_Station/Building_the_International_Space_Station3
- **URLs of space agencies for nations participating in ISS:**
 - USA (NASA) <http://www.nasa.gov/>
 - Canada (CSA) <http://www.asc-csa.gc.ca/index.html>
 - Russia (ROSCOSMOS)
<https://www.roscosmos.ru/>
 - Japan (JAXA) <http://global.jaxa.jp/>
 - Europe (ESA) <http://www.esa.int/ESA>
 - Denmark (DSRI) <http://www.space.dtu.dk/english>
 - France (CNES) <https://cnes.fr/fr>
 - Germany (DLR) <http://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10002/>
 - Italy (ASI) <http://www.asi.it/>
 - Netherlands (NSO) <https://www.spaceoffice.nl/en/>
 - Norway (NSC) <https://www.romsenter.no/eng>
 - Spain (INTA) <http://www.inta.es/opencms/export/sites/default/INTA/es/>
 - Sweden (SSC) <http://www.sscspace.com/>
 - Switzerland (SSO) <http://space.epfl.ch/>
 - United Kingdom (UK Space Agency)
<https://www.gov.uk/government/organisations/uk-space-agency>
- Belgium does not have a space agency as of when this lesson plan was written, but is a participating member of the ESA and has considered plans for its own national space agency.

